Welding Technology

Program of Studies
2014-2015

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Office of Career and Technical Education
Kentucky Department of Education

Welding Technology

Program Area Course Title	Post-Secondary Connection	Valid Course Code	Recommended Grade Level							Recommended Credit
			6	7	8	9	10	11	12	
Basic Blueprint Reading	BRX 120	470302				X	X	X	X	.5
Basic Welding A	WLD 151	480503				X	X	X	X	.5
Basic Welding B	WLD 152	480504				X	X	X	X	1
Blueprint Reading for Welding	WLD 170	480505				X	X	X	X	.5
Blueprint Reading for Welding Lab	WLD 171	480506				X	X	X	X	.5
Cooperative Education I	WLD 199	480541							X	1
Cooperative Education II	WLD 299	480542							X	2
Cooperative Education III	WLD 199 & 299	480543							X	3
Cutting Processes	WLD 110	480501				X	X	X	X	.5
Cutting Processes LAB	WLD 111	480502				X	X	X	X	.5
Gas Tungsten Arc Welding	WLD 130	480525					X	X	X	.5
Gas Tungsten Arc Welding (fillet lab)	WLD 131	480529					X	X	X	.5
Gas Metal Arc Welding	WLD 140	480522				X	X	X	X	.5
Gas Metal Arc Welding Lab	WLD 141	480532				X	X	X	X	.5
Gas Metal Arc Welding Groove Lab	WLD 143	480533					X	X	X	1
Gas Tungsten Arc Welding Pipe Lab A	WLD 235	480538					X	X	X	1
GMAW Aluminum Lab	WLD 145	480534					X	X	X	.5
GMAW Pipe Lab A	WLD 245	480540					X	X	X	1
GTAW Groove Lab	WLD 133	480530					X	X	X	1
Internship (Welding)	WLD 198	480544						X	X	1-3
Oxy-Fuel Systems	WLD 100	480523				X	X	X	X	.5
Oxy-Fuel Systems Lab	WLD 101	480526				X	X	X	X	.5
Shielded Metal Arc Welding Pipe Lab A	WLD 227	480536					X	X	X	1
Shielded Metal Arc Welding Pipe Lab B	WLD 229	480537					X	X	X	1
Shielded Metal Arc Welding (SMAW)	WLD 120	480521				X	X	X	X	.5
SMAW Fillet Lab	WLD 121	480527				X	X	X	X	.5
SMAW Groove Welds with Backing Lab	WLD 123	480528					X	X	X	1
SMAW Open Groove Lab	WLD 225	480535					X	X	X	1
Special Problems (Welding)	IEX 293	480595					X	X	X	1
Welding Certification	WLD 220	480507					X	X	X	.5
Welding Certification Lab	WLD 221	480508					X	X	X	.5

Welding Technology
Overview of Welding Technology

Purpose:

The vision of Welding Technology is to promote safety standards, performance standards, enhance leadership, provide relevant curriculum, and to be vital to the education of all students.

Welding Technology will:

- Operate as the venue for nationally recognized industry standard training.
- Provide a critical link in school to employment or postsecondary education.
- Develop stronger relationships with the community in terms of mutual advocacy, cooperative field experiences, employment placement, and support for relevant student organizations and competitions
- Represent an important component in the education of all students.
- Require and promote critical thinking and problem solving.
- Offer an up to date curriculum based on standards that adapts to changes in the industry.
- Integrate academic skills into the Computerized Manufacturing and Machining Technology Curriculum in order to insure that students develop written & verbal communications skills, computational skills, and scientific/math problem-solving skills.

Career Pathways:

- ***Welder-Entry Level***
- ***Pipe Welder***
- ***Arc Welder***
- ***Gas Metal Arc Welder***
- ***Gas Tungsten Arc Welder***
- ***Shielded Metal Arc Welder***

Standard Based Curriculum

The Welding Technology Curriculum is composed of standards based competencies. All Welding Technology programs incorporate industry and common core standards thus increasing the student's qualifications toward successful employment.

Alignment of the Welding Technology curriculum with nationally recognized industry standards and the common core standards provides optimal preparation for students to acquire an industry certification.

Communities understand that this preparation provides better career opportunities for students and the demands of today's workforce for the 21st century.

Kentucky Occupational Skill Standards

The Kentucky Occupational Skill Standards are the performance specifications that identify the knowledge, skills, and abilities an individual needs to succeed in the workplace. Identifying the necessary skills is critical to preparing students for entry into employment or postsecondary education. These standards described the necessary occupational, academic, and employability skills needed to enter the workforce or post- secondary education in specific career areas. There is an ongoing effort to continue to refine these standards by which exemplary Career and Technical Education Programs ms are evaluated and certified. This helps insure that curriculum meets industry specifications.

Work Based Learning

Cooperative experience, internships, shadowing and mentoring opportunities provide depth and breadth of learning in the instructional program and allow students to apply the concepts learned in the classroom. The Work Base Learning Guide is available on the KDE webpage: www.education.ky.gov.

Student Organizations and Competitions

Participation in Skills USA Competition provides a vehicle for students to employ higher order thinking skills, to interact with high-level industry people and to further enhance their leadership skill through their participation in regional, state and national competitive events and local activities.

Career Pathways Welding Technology 2014-2015		
Career Pathway	**Core Courses**	**Elective Courses**
• ***Welder-Entry Level*** **CIP Code-48.0508.01** *Tests for Certification* *2-F (AWS)* American Welding Society *Qualification Certification* (AWS) American Welding Society SENSE Kentucky Department of Transportation 3-G TRACK Pre-Apprenticeship * KOSSA-Manufacturing Test	• **Blueprint Reading for Welding-480505** • **Blueprint Reading for Welding (lab)-480506** • **Oxy-fuel Systems-480523** • **Oxy-fuel Systems (lab)-480526** **OR** • **Cutting Processes-480501** • **Cutting Processes (lab)-480502** • **Shielded metal Arc Welding (SMAW)-480521\470354** • **Shielded Metal Arc Welding (SMAW) (lab)-480527\470355** • **Gas Metal Arc Welding-480522** • **Gas Metal Arc Welding Fillet (Lab)-480532** • **GMAW Groove Lab-480533** **OR** • **SMAW Groove Welds with Backing Lab-480528**	• **Basic Blueprint Reading-470302** • **Basic Welding A-480503** • **Basic Welding B-480504** • **Blueprint Reading for Welding-480505** • **Blueprint Reading for Welding (lab)-480506** • **Cooperative Education I - 480541** • **Cooperative Education II - 480542** • **Cooperative Education III - 480543** • **Oxy-fuel Systems-480523** • **Oxy-fuel Systems (lab)-480526** • **Gas Tungsten Arc Welding-480525** • **Gas Tungsten Arc Welding (lab)-480529** • **Internship (Weld)-480544** • **IEX 293 Special Problems (Welding)-480595** • **SMAW Groove Welds with Backing Lab-480528** • **Welding Certification-480507** • **Welding Certification Lab-480508** • **PLTW IED-Introduction to Engineering Design-219901**

• ***Pipe Welder*** **CIP Code-48.0508.02** <u>*Tests for Certification*</u> *2-F (AWS)* American Welding Society *Qualification Certification* (AWS) American Welding Society SENSE Kentucky Department of Transportation 3-G TRACK Pre-Apprenticeship * KOSSA-Manufacturing Test	• **Blueprint Reading for Welding-480505** • **Blueprint Reading for Welding (lab)-480506** • **Oxy-fuel Systems-480523** • **Oxy-fuel Systems (lab)-480526** **OR** • **Cutting Processes-480501** • **Cutting Processes (lab)-480502** • **Shielded metal Arc Welding (SMAW)-480521\470354** • **Shielded Metal Arc Welding (SMAW) (lab)-480527\470355** • **Gas Metal Arc Welding-480522** • **Gas Metal Arc Welding Fillet (Lab)-480532** • **Shielded Metal Arc Welding Pipe Lab A-480536**	**Basic Blueprint Reading-470302** • **Basic Welding A-480503** • **Basic Welding B-480504** • **Blueprint Reading for Welding-480505** • **Blueprint Reading for Welding (lab)-480506** • **Cooperative Education I - 480541** • **Cooperative Education II - 480542** • **Cooperative Education III - 480543** • **Oxy-fuel Systems-480523** • **Oxy-fuel Systems (lab)-480526** • **GMAW Pipe Lab A-480540** • **Internship (Weld)-480544** • **SMAW open Groove Lab-480535** • **Gas Tungsten Arc Welding-480525** • **Gas Tungsten Arc Welding (lab)-480529** • **Shielded Metal Arc Welding Pipe Lab B-480537** • **IEX 293 Special Problems (Welding)-480595** • **Welding Certification-480507** • **Welding Certification Lab-480508** • **PLTW IED-Introduction to Engineering Design-219901**
• ***ARC Welder*** **CIP Code-48.0508.03** <u>*Tests for Certification*</u> *2-F (AWS)* American Welding Society *Qualification Certification* (AWS) American Welding Society SENSE Kentucky Department of Transportation 3-G TRACK Pre-Apprenticeship * KOSSA-Manufacturing Test	• **Blueprint Reading for Welding-480505** • **Blueprint Reading for Welding (lab)-480506** • **Oxy-fuel Systems-480523** • **Oxy-fuel Systems (lab)-480526** **OR** • **Cutting Processes-480501** • **Cutting Processes (lab)-480502** • **Gas Metal Arc Welding-480522** • **Gas Metal Arc Welding Fillet (Lab)-480532** • **Shielded metal Arc Welding (SMAW)-480521\470354** • **Shielded Metal Arc Welding (SMAW) (lab)-480527\470355**	• **Basic Blueprint Reading-470302** • **Basic Welding A-480503** • **Basic Welding B-480504** • **Cooperative Education I - 480541** • **Cooperative Education II - 480542** • **Cooperative Education III - 480543** • **GMAW Aluminum Lab-480534** • **Gas Tungsten Arc Welding-480525** • **Gas Tungsten Arc Welding (lab)-480529** • **Internship (Weld)-480544** • **IEX 293 Special Problems (Welding)-480595** • **Welding Certification-480507** • **Welding Certification Lab-480508** • **PLTW IED-Introduction to**

		Engineering Design-219901
• ***Gas Metal Arc Welder*** **CIP Code-48.0508.04** *Tests for Certification* *2-F (AWS)* American Welding Society *Qualification Certification* (AWS) American Welding Society SENSE Kentucky Department of Transportation 3-G TRACK Pre-Apprenticeship * KOSSA-Manufacturing Test	• **Blueprint Reading for Welding-480505** • **Blueprint Reading for Welding (lab)-480506** • **Oxy-fuel Systems-480523** • **Oxy-fuel Systems (lab)-480526** **OR** • **Cutting Processes-480501** • **Cutting Processes (lab)-480502** • **Gas Metal Arc Welding-480522** • **Gas Metal Arc Welding Fillet (Lab)-480532** • **GMAW Groove Lab-480533**	• **Basic Blueprint Reading-470302** • **Basic Welding A-480503** • **Basic Welding B-480504** • **Cooperative Education I - 480541** • **Cooperative Education II - 480542** • **Cooperative Education III - 480543** • **GMAW Aluminum Lab-480534** • **IEX 293 Special Problems (Welding)-480595** • **Internship (Weld)-480544** • **Special Problems-** • **Welding Certification-480507** • **Welding Certification Lab-480508** • **PLTW IED-Introduction to Engineering Design-219901**
Gas Tungsten Arc Welder **CIP Code-48.0508.05** *Tests for Certification* *2-F (AWS)* American Welding Society *Qualification Certification* (AWS) American Welding Society SENSE Kentucky Department of Transportation 3-G TRACK Pre-Apprenticeship * KOSSA-Manufacturing Test	• **Blueprint Reading for Welding-480505** • **Blueprint Reading for Welding (lab)-480506** • **Oxy-fuel Systems-480523** • **Oxy-fuel Systems (lab)-480526** **OR** • **Cutting Processes-480501** • **Cutting Processes (lab)-480502** • **Gas Tungsten Arc Welding-480525** • **Gas Tungsten Arc Welding (lab)-480529** • **GTAW Groove Lab-480530**	• **Basic Blueprint Reading-470302** • **Basic Welding A-480503** • **Basic Welding B-480504** • **Blueprint Reading for Welding-480505** • **Blueprint Reading for Welding (lab)-480506** • **Cooperative Education I - 480541** • **Cooperative Education II - 480542** • **Cooperative Education III - 480543** • **Gas Tungsten Arc Welding Pipe Lab-A-480538** • **GMAW Aluminum Lab-480534** • **GMAW Groove Lab-480533** • **Internship (Weld)-480544** • **IEX 293 Special Problems**

		(Welding)-480595 • **Welding Certification-480507** • **Welding Certification Lab-480508** • **PLTW IED-Introduction to Engineering Design-219901**
• ***Shielded Metal Arc Welder*** **CIP Code-48.0508.06** *Tests for Certification* *2-F (AWS)* American Welding Society *Qualification Certification* (AWS) American Welding Society SENSE Kentucky Department of Transportation 3-G TRACK Pre-Apprenticeship * KOSSA-Manufacturing Test	• **Blueprint Reading for Welding-480505** • **Blueprint Reading for Welding (lab)-480506** • **Oxy-fuel Systems-480523** • **Oxy-fuel Systems (lab)-480526** **OR** • **Cutting Processes-480501** • **Cutting processes (lab)-480502** • **Shielded Metal Arc Welding (SMAW)-480521\470354** • **Shielded Metal Arc Welding (SMAW) (lab)-480527\470355** • **SMAW Groove Welds with Backing Lab-480528** • **SMAW open**	• **Basic Blueprint Reading-470302** • **Basic Welding A-480503** • **Basic Welding B-480504** • **Cooperative Education I - 480541** • **Cooperative Education II - 480542** • **Cooperative Education III - 480543** • **Internship (Weld)-480544** • **IEX 293 Special Problems (Welding)-480595** • **SMAW Fillet Lab** • **Welding Certification-480507** • **Welding Certification Lab-480508** • **PLTW IED-Introduction to Engineering Design-219901**
• **Welding Technology-TRACK** **CIP Code-48.0508.99** *Tests for Certification* *2-F (AWS)* American Welding Society *Qualification Certification* (AWS) American Welding Society SENSE Kentucky Department of Transportation 3-G TRACK Pre-Apprenticeship * KOSSA-Manufacturing Test	• **(4)- Core courses** • **Chosen from IMT valid course list.** • **By Company sponsoring State Registered Apprenticeship.**	• **(4)- Core courses** • **Chosen from IMT valid course list.** • **By Company sponsoring State Registered Apprenticeship.**

KENTUCKY CAREER PATHWAY/PROGRAM OF STUDY 2014-2015

COLLEGE/UNIVERSITY: Technical College(KCTCS) / Kentucky Universities
HIGH SCHOOL (S): KY ATC/CTC
CLUSTER: Manufacturing
PATHWAY: Welding
PROGRAM: Welding Technology

	GRADE	ENGLISH	MATH	SCIENCE	SOCIAL STUDIES	REQUIRED COURSES / RECOMMENDED ELECTIVE COURSES / OTHER ELECTIVE COURSES / CAREER AND TECHNICAL EDUCATION COURSES			CREDENTIAL CERTIFICATE DIPLOMA DEGREE	SAMPLE OCCUPATIONS
SECONDARY	9	English I	Algebra I	Earth Space Science	World History	Health and PE	CIS 100 Intro to Computers	WLD 151 Basic Welding A - 470302		
	10	English II	Geometry	Biology I	World Civics	History and Appreciation of Fine Arts	WLD 110/111 Cutting Processes-480502/03	WLD 170/171 Blueprint Reading for		
	11	English III	Algebra II	Physics or Chemistry	U.S. History	Foreign Language	WLD 120/121 Shielded Metal Arc Welding-480521/27	WLD 123 Shielded Metal Arc Welding-	2F Industry Certification	Sheilded Metal Arc Welder/ ARC Welder
	12	English IV	Math Elective	Computer Aided Drafting (elective)	World Geography	WLD 130/131 Gas Tungsten Arc Welding/Lab-	WLD 140/141 Gas Metal Arc Welding- 480522/32	WLD 143 GMAW Groove Lab- 480533	KY DOT Certification /TRACK Pre-Apprenticeship/ KOSSA	Gas Metal Arc Welder/ Welder Entry Level 1
POSTSECONDARY	Year 13	ENG 101 Writing I	MT 110 Applied Mathematics	ASTR 104 Astronomy	College Chemistry	PSY 100 Intro Psychology	Process Principles	Occupation Safety	Certified Combination Arc Welder	Industry Apprenticeship Boilermaker/ Pipe Fitter
	Year 14	Math	WLD 225 SMAW Open Groove Lab	WLD 221 Certification Lab	HIS 109 US History	ENG 200 Intro/Literature	Materials Science		Associates Degree in Applied Science	Certified Welder Inspector/Welding Technician
	Year 15	PHY 195 METHODS OF ENG. PHYSICS	MAT 250 CALCULUS	PHY 236 UNIV. PHYSICS I	MAT 308 CALCULUS II	ENG 102 ENGLISH COMP. II	CIV 102 WORLD CIV. II	TECHNICAL ELECTIVE		
	Year 16	PHY 140 INTRO. COMPUTING APPS.	PHY 255 UNIV. PHYSICS II	PHY 259 STATICS	MAT 309 CALCULUS III	MAT 411 DIFFERENTIAL S EQTNS.	PHY 264 LINEAR CIRCUITS I	PHY 330 DYNAMICS	B.S. Welding Engineering	Welding Metallurgist
	Year 17	PHY 344 FLUID MECHANICS	PHY 370 INTRO. MODERN PHYSICS	CHE 201 GEN. COLLEGE CHEM. I	HUM 211 HUMANITIES	ITD 102 CAD APPLICATIONS	PHY 346 HEAT TRANSFER	PHY 375 MATERIALS SCIENCE	PHY 390 ENGR. MEASUREMENT	TECH.ELECTIVE
	Year 17	PHY 359 MECHANICS OF MATERIALS	PHY 470 OPTICS	PHY 498 SENIOR ENGR. DESIGN I	ECO 231 PRINC. OF MICROECONOMICS	PHY 499 SENIOR ENGR. DESIGN II	TECHNICAL ELECTIVE	MAT DEPTH ELECTIVE	FREE ELECTIVE	HUM/FA ELEC.
								BACHELORS DEGREE ENGINEERING	Western Kentucky UNIVERSITY	ENGINEER

Other Elective Courses
Career and Technical Education Courses
Credit-Based Transition Programs (e.g. Dual/Concurrent Enrollment, Articulated Courses, 2+2+2)
(◆=High School to Comm. College) (● =Com. College to 4-Yr Institution) (■ = Opportunity to test out)
Mandatory Assessments, Advising, and Additional Preparation
TECHNICAL COLLEGE CREDIT GIVEN THROUGH THE KCTCS DUAL ENROLLMENT PROGRAM
Certificate given through the Warren County Area Technology Center
Degree given through the Bowling Green Technical College KCTCS
DEGREE GIVEN THROUGH THE MURRAY STATE UNIVERSITY

Funded by the U. S. Department of Education
(V051B020001)
Revised Jan. 2005
October, 2006-CTE/Kentucky

CCTI College and Career Transitions Initiative

Welding Technology Courses-Competencies

Basic Blueprint Reading
470302

Course Description: This course presents basic applied math, lines, multi-view drawings, symbols, various schematics and diagrams, dimensioning techniques, sectional views, auxiliary views, threads and fasteners, and sketching typical to all shop drawings. Safety will be emphasized as an integral part of the course.
Prerequisites: None

Content/ Process

Students Will:

1. Introduction and math review (fractions and decimals)
2. Identify the alphabet of lines
3. Identify multiple views
4. Arrange multiple views
5. Arrange two-view drawings
6. Identify one-view drawings
7. Arrange and identify auxiliary views
8. Demonstrate the use of size and location dimensions
9. Demonstrate proper dimensions of cylinders and arcs
10. Size dimensions of holes and angles
11. Locate dimensions for centering of holes, points, and centers
12. Interpret the base line dimensions on drawings
13. Identify half, full, and removed sections
14. Identify electrical schematic and diagram symbols
15. Identify welding symbols and equipment
16. Interpret ordinate and tabular dimensions
17. Set tolerances using geometric dimensioning techniques
18. Sketch parts with irregular shapes
19. Sketch oblique views of various parts
20. Sketch and dimension shop drawings
21. Dimension parts using shop notes
22. Calculate tolerances
23. Identify labeling of various screw threads
24. Calculate tapers and machined surfaces
25. Interpret connections and flow of various electrical, hydraulic, and pneumatic schematics and diagrams

Connections:

- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Basic Welding A
480503

Course Description:
Introduction to welding, cutting processes, and related equipment. Basic setup, operation, and related safety are applied.
Prerequisites: None

Content/ Process

Students Will:

1. Practice welding safety
2. Setup and operate various welding and cutting equipment

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Basic Welding B
480504

Course Description:
Introduction to welding, cutting processes, and related equipment. Basic setup, operation, and related safety are applied.
Prerequisites: None

Content/ Process

Students Will:

1. Apply cutting, welding, and shop safety procedures
2. Apply principles of Oxy-Fuel and Plasma Arc cutting processes
3. Apply principles of SMAW, GMAW, and GTAW welding processes.

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Blueprint Reading for Welding
480505

Course Description:
Provides a study of occupationally specific prints for welders. Advanced study of multi-view drawings, assembly drawings, datum dimensions, numerical control drawings, sheet metal prints, castings and forgings, instrumentation and control charts and diagrams, working drawings, geometric dimensioning and tolerance and use of reference materials and books are included. Occupational specifics including welding drawings, symbols, joint types, grooves, pipe welding symbols, testing symbols, and specification interpretations are stressed.

Co-requisite: Blueprint reading for Welding Lab-480506
or Consent of Instructor

Content/ Process

Students Will:

1. Interpret lines
2. Interpret views to include AWS, (ISO symbols optional)
3. Interpret conventional and datum line dimensions
4. Interpret and apply tolerances
5. Interpret section lines
6. Interpret sectioning
7. Interpret and apply American Welding Society welding symbols
8. Interpret and apply International Standard welding symbols
9. Draw shop sketches
10. Interpret various types of prints to include fabrication, repair, structural steel, and piping prints.

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Blueprint Reading for Welding Lab
480506

Course Description:
Provides students with practice fabricating from a blueprint. Students will read and fabricate from detail prints, control distortion during fabrication, and follow the proper sequence in welding a fabricated part. Students will use welding symbols and study weld sizes and strengths.

Co-requisite: Blueprint reading for Welding -480505
or Consent of Instructor

Content/ Process

Students Will:

1. Practice shop safety
2. Read and interpret blueprints
3. Complete projects from prints
4. Practice controlling distortion
5. Practice repairing distortion

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Cooperative Education I
480541

Course Description:
Cooperative Education provides supervised on-the-job work experience related to the students' educational objectives. Students participating in the Cooperative Education program receive compensation for their work.

Prerequisite: Consent of Instructor

Content/ Process

Students Will:

1. **Gain career awareness and the opportunity to test career choice(s)**
2. **Receive work experience related to career interests prior to graduation**
3. **Integrate classroom studies with work experience**
4. **Receive exposure to facilities and equipment unavailable in a classroom setting**
5. **Increase employability potential after graduation**
6. **Earn funds to help finance education expenses**

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Cooperative Education II
480542

Course Description:
Cooperative Education provides supervised on-the-job work experience related to the students' educational objectives. Students participating in the Cooperative Education program receive compensation for their work.

Prerequisite: Consent of Instructor

Content/ Process

Students Will:

1. **Gain career awareness and the opportunity to test career choice(s)**
2. **Receive work experience related to career interests prior to graduation**
3. **Integrate classroom studies with work experience**
4. **Receive exposure to facilities and equipment unavailable in a classroom setting**
5. **Increase employability potential after graduation**
6. **Earn funds to help finance education expenses**

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Cooperative Education III
480543

Course Description:
Cooperative Education provides supervised on-the-job work experience related to the students' educational objectives. Students participating in the Cooperative Education program receive compensation for their work.

Prerequisite: Consent of Instructor

Content/ Process

Students Will:

1. **Gain career awareness and the opportunity to test career choice(s)**
2. **Receive work experience related to career interests prior to graduation**
3. **Integrate classroom studies with work experience**
4. **Receive exposure to facilities and equipment unavailable in a classroom setting**
5. **Increase employability potential after graduation**
6. **Earn funds to help finance education expenses**

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Cutting Processes
480501

Course Description:
A working knowledge of various cutting processes used by the welding industry. Will include, but is not limited to, safety, theory of operation, setup and operating techniques, troubleshooting, and making minor equipment repairs, terms and definitions, identification, evaluation, repair and prevention of discontinuities of cut surfaces. Includes oxy-fuel cutting, plasma arc cutting, exothermic cutting, air carbon arc cutting, shielded metal arc cutting, and mechanical cutting process.

Co-requisites: Cutting Processes Lab-480502

Content/ Process

Students Will:

1. Practice cutting processes safety procedures
2. Discuss the welding theories of operation
3. Discuss setup and operating techniques
4. Apply principles of troubleshooting and making minor equipment repairs.
5. Identify, evaluate, repair, and prevent reoccurrence of discontinuities of cut surfaces.

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Cutting Processes Lab
480502

Course Description:
Designed to provide the student with practical experience to become proficient in the use of various metal cutting processes. Safety, setup, and operating techniques are employed. Students will troubleshoot and make minor repairs to equipment. Students will also learn to identify, repair, and prevent reoccurrence of cut surface discontinuities. Processes shall include, but is not limited to: OFC, PAC, AAC, and mechanical methods. Various materials will be used where appropriate.

Co-requisites: Cutting Processes-480501

Content/ Process

Students Will:

1. Perform welding skills safely.
2. Apply welding theories of operation
3. Perform setup and operating techniques
4. Troubleshoot and make minor equipment repairs
5. Identify, evaluate, repair, and prevent reoccurrence of discontinuities of cut surfaces.

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Gas Tungsten Arc Welding
480525

Course Description:
Identification, inspection, and maintenance of GTAW machines; identification, selection and storage of GTAW electrodes; principles of GTAW; the effects of variables on the GTAW process; and metallurgy. This course also teaches the theory and application of Plasma Arc Cutting.

Co-requisites: Gas Tungsten Arc welding Fillet lab-480529
or Consent of Instructor

Content/ Process

Students Will:

1. Practice lab safety procedures
2. Use lab equipment and tools
3. Apply principles of GTAW to weld metals
4. Set up GTAW systems
5. Apply knowledge of effects of variables to weld plate and pipe
6. Apply knowledge of basic metallurgy to control chemical, physical, and mechanical characteristics of non-ferrous metals
7. Identify and select GTAW electrodes
8. Identify and select GTAW fill rods
9. Clean metals with solvent or cleaning fluids
10. Set up and operate plasma arc cutting equipment.

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Gas Tungsten Arc Welding Lab
480529

Course Description:

Teaches the necessary manipulative skills needed to apply the Gas Tungsten Arc on various joint designs, on plate with both ferrous and non-ferrous metals. Plasma Arc cutting is included.

Co-requisite: Gas Tungsten Arc Welding -480525

Content/ Process

Students Will:

1 Weld fillet welds on carbon steel plate in all positions
2 Weld aluminum fillet welds in all positions
3 Weld stainless steel fillet welds in all positions
4 Cut with plasma equipment

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Gas Metal Arc Welding
480522

Course Description:

Identification, inspection, and maintenance of GMAW machines; identification, selection and storage of GMAW electrodes; principles of GMAW; and the effects of variables on the GMAW process. Theory and applications of related processes such as FCAW and SAW and metallurgy are also included.

Prerequisites: None

Content/ Process

Students Will:

1. Practice lab safety procedures
2. Use lab equipment and tools
3. Apply principles of GMAW to weld metals, to include FCAW and SAW
4. Apply knowledge of the effects of variables of GMAW to weld plate and pipe
5. Apply knowledge of basic metallurgy to control chemical, physical, and mechanical properties of alloy steels
6. Identify and select filler materials for GMAW processes

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Gas Metal Arc Welding Lab
480532

Course Description:

Teaches the practical application and manipulative skills of Gas Metal Arc Welding and the proper safety situations needed in this process. Both ferrous and non-ferrous metals will be covered, as well as various joint designs on plate in all positions.

Co-requisite: Gas metal Arc welding-480522

Content/ Process

Students Will:

1. Practice lab safety
2. Weld fillet welds in all positions using various transfer modes on steel, stainless steel, and aluminum

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Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Gas Metal Arc Welding Groove Lab
480533

Course Description:

Teaches the method of operation and application of the Gas Metal Arc Welding process for welding groove welds in both ferrous and non-ferrous plate in all positions using both short circuiting and spray transfer where appropriate.
Prerequisites: Gas Metal Arc Welding-480522 or
Consent of Instructor

Content/ Process

Students Will:

1. Practice lab safety procedures
2. Weld groove welds on ferrous and non-ferrous plate in all positions with short circuiting and spray transfer where appropriate

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Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Gas Tungsten Arc Welding Pipe Lab A
480538

Course Description:

Teaches the method of operation and application of the Gas Tungsten Arc Welding system for welding of both ferrous and non-ferrous pipe in 2G and 5G positions.

Prerequisites: GTAW Groove Lab-480530 or
Consent of Instructor

Content/ Process

Students Will:

1. Practice lab safety procedures
2. Weld pipe (GTAW)

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

GMAW Aluminum Lab
480534

Course Description:

Teaches welding aluminum using GMAW process. Fillet and groove welds are made in all positions on both plate and pipe. Short circuiting and spray transfers are used where appropriate.

Prerequisites: Gas Metal Arc Welding-480522
or Consent of Instructor

Content/ Process

Students Will:

1. Weld fillet and groove welds on aluminum plate in all positions using GMAW-S
2. Weld fillet and groove welds on aluminum plate in all positions using Spray transfer GMAW.
3. Weld fillet and groove welds on aluminum pipe in all positions.

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

GMAW Pipe Lab A
480540

Course Description:

Acquaints the student with the operation and application of the Gas Metal Arc System for welding pipe in 2G and 5G positions.

Co-requisite: Gas Metal Arc Welding Groove Lab-480533
or Consent of Instructor

Content/ Process

Students Will:

1. Practice lab safety procedures
2. Weld pipe in 2G and 5G (GMAW)

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

GTAW Groove Lab
480530

Course Description:

Teaches the method of operation and application of the Gas Tungsten Arc Welding process for welding groove welds in both ferrous and non-ferrous plate in all positions.

Prerequisite: Gas Tungsten Arc Welding -480525
or Consent of Instructor

Content/ Process

Students Will:

1. Practice lab safety procedures
2. Weld groove welds in ferrous and non-ferrous plate in all positions.

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Internship I
480544

Course Description:

The practicum provides supervised on-the-job work experience related to the students' education objectives. Students participating in the practicum do not receive compensation.

Prerequisites: Consent of Instructor

Content/ Process

Students Will:

1. Gain career awareness and the opportunity to test career choice(s)
2. Receive work experience related to career interests prior to graduation
3. Integrate classroom studies with work experience
4. Receive exposure to facilities and equipment unavailable in a classroom setting
5. Increase employability potential after graduation.

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO’s-Skills USA

Oxy-Fuel Systems
480523

Course Description:

A working knowledge of: oxy-fuel identification, set-up, inspection, and maintenance; consumable identification, selection and care; principles of operation; and effects of variables for manual and mechanized oxy-fuel cutting, welding, brazing principles and practice, and metallurgy. Shop safety and equipment use are also covered.

Co-requisites: Oxy-Fuel Systems Lab-480526

Content/ Process

Students Will:

1. Practice oxy-fuel welding safety procedures
2. Use shop equipment and tools
3. Apply principles of oxy-fuel systems to cut, weld, braze, and braze-weld with oxy-fuel
4. Apply principles of controlling distortion
5. Setup components of oxy-fuel equipment and setup procedures
6. Apply oxy-fuel cutting applications and procedures
7. Apply oxy-fuel welding applications and procedures
8. Apply brazing and braze welding principles and applications.

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Oxy-Fuel Systems Lab
480526

Course Description:

Instruction on the manipulative skills necessary to weld and cut plate and pipe in all positions, as well as brazing, braze welding and gouging.

Co-requisite: Oxy-Fuel Systems-480523

Content/ Process

Students Will:

1. Practice and perform shop procedures safely.
2. Set up oxy-fuel equipment for cutting
3. Cut carbon steel plate and pipe
4. Weld carbon steel
5. Braze weld cast iron.

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Shielded Metal Arc Welding Pipe Lab A
480536

Course Description:

Teaches the required manipulative skills to arc weld pipe using mild steel electrodes in the 2G and 5G positions including proper pipe preparations, electrodes, safety precautions, and welding sequences. Fillet welds on pipe joints are also included in 2F, 2FR, 4F, and 5F positions.

Prerequisites: SMAW Open groove Lab-480535

Content/ Process

Students Will:

1. Use lab equipment and tools.
2. Apply principles of SMAW

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Shielded Metal Arc Welding Pipe Lab B
480537

Course Description:

Teaches the required manipulative skills to arc weld pipe using mild steel electrodes in the 6G position including proper pipe preparations, electrodes, safety precautions, and welding sequences.
Prerequisites: SMAW Open groove Lab-480535

Content/ Process

Students Will:

1. Practice lab safety procedures.
2. Weld pipe (SMAW).

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Shielded Metal Arc Welding (SMAW)
480521

Course Description:

Teaches students the identification, inspection, and maintenance of SMAW electrodes; principles of SMAW; the effects of variables on the SMAW process to weld plate and pipe; and metallurgy.
Co-requisites: SMAW Fillet lab-480527
or Consent of Instructor

Content/ Process

Students Will:

1. Practice welding safety procedures
2. Identify, select, and store SMAW electrodes
3. Apply principles of SMAW process to cut and weld metals
4. Apply the knowledge of the effects of variables on the SMAW process to weld plate and pipe
5. Apply the knowledge of basic metallurgy to control chemical, physical, and mechanical properties of carbon steel
6. Use shop equipment and tools.

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

SMAW Fillet Lab
480527

Course Description:

Provides laboratory experiences in which the student acquires the manipulative skills to perform fillet welds in all positions.

Co-requisites: Shielded Metal Arc Welding (SMAW)-480521
or Consent of Instructor

Content/ Process

Students Will:
Practice welding procedures safely
Identify, select, and store SMAW electrodes
Apply principles of SMAW process to cut and weld metals.
Apply knowledge of the effects of variables on the SMAW process to weld plate and pipe.
Apply knowledge of basic metallurgy to control chemical, physical, and mechanical properties of carbon steel.
Use shop equipment and tools appropriately.

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

SMAW Groove Welds with Backing Lab
480528

Course Description:

Provides experiences in which students acquire the manipulative skills to do groove welds in all positions with backing.

Prerequisites: Shielded Metal Arc Welding (SMAW)-480521
SMAW Fillet lab-480527
or Consent of Instructor

Content/ Process

Students Will:

1. Practice lab safety procedures
2. Weld SMAW groove welds in all positions

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

SMAW Open Groove Lab
480535

Course Description:

Designed to build upon SMAW Plate Lab I and II. Offers the student the opportunity to advance skills in the practical aspects of vee-butt plate welding using SMAW.

Prerequisites: Shielded Metal Arc Welding (SMAW)-480521
SMAW Fillet lab-480527
or Consent of Instructor

Content/ Process

Students Will:

1. Use lab equipment and tools safely
2. Apply principles of SMAW to welding
3. Perform skills in vee-butt plate welding

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

IEX 293 Special Problems
480595

Course Description:

This is a course designed for the student who has demonstrated specific needs.

Prerequisites: Permission of Instructor

Content/ Process

Students Will:

1. Selected tasks/problems as determined by the instructor

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Welding Certification
480507

Course Description:

Provides the student with a working knowledge of certification encountered in welding. The student will start with developing a WPS, qualify the WPS, and qualify personnel. Documents used in welding certification are developed and used.

Co-requisites: Welding Certification Lab-480508 or Consent of Instructor

Content/ Process

Students Will:

1. **Learn welding safety procedures**
2. **Apply destructive and non-destructive testing methods**
3. **Apply knowledge of procedure qualification**
4. **Apply knowledge of performance qualification**
5. **Apply knowledge of welding codes**
6. **Apply knowledge of welding standards**
7. **Apply knowledge of welding specifications.**

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA

Welding Certification Lab
480508

Course Description:

Provides the student with an opportunity to test to certification standards on all types of welding.

Co-requisites: Welding Certification -480507 or
Consent of Instructor

Content/ Process

Students Will:

1. Practice safety procedures
2. Perform guided bend test
3. Perform qualification test using SMAW to certification standards on plate and/or pipe
4. Perform qualification test using GMAW to certification standards on plate and/or pipe
5. Perform qualification test using GTAW to certification standards on plate and/or pipe.

Connections:

- Common Core Standards
- KOSSA
- Common Core Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- Post-Secondary Education
- CTSO's-Skills USA